

## P- CHANNEL DYNAMIC FLASH MEMORY CELLS WITH ULTRATHIN TUNNEL OXIDES

### Abstract of the Disclosure

5 Structures and methods involve dynamic enhancement mode p-channel flash  
memories with ultrathin tunnel oxide thicknesses. Both write and erase operations  
are performed by tunneling. The p-channel flash memory cell with thin tunnel  
oxides will operate on a dynamic basis. The stored data can be refreshed every few  
seconds as necessary. However, the write and erase operations will now be orders  
10 of magnitude faster than traditional p-channel flash memory. Structures and  
methods for p-channel floating gate transistors are provided that avoid p-channel  
threshold voltage shifts and achieve source side tunneling erase. The p-channel  
memory cell structure includes a floating gate separated from a channel region by an  
oxide layer of less than 50 Angstroms. The methods further include reading the p-  
15 channel memory cell by applying a potential to a control gate of the p-channel  
memory cell of less than 1.0 Volt.

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